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BURGH OF MOTHERWELL AND WISHAW

ANNUAL REPORT

OF THE

SEWAGE WORKS MANAGER

FOR THE

Year ended December 31st, 1956

DONALD H. BARRACLOUGH,
F.I.P.H.E., M.Inst.S.P., M.R.S.H.

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MEMBERS OF THE STREETS AND DRAINAGE COMMITTEE - 1956

January to May	May to December
Provost C. Donnelly (Ex-officio)	Provost B. Brogan (Ex-officio)
Police Judge T. Wilson (Convener)	Councillor T. Train (Convener)
Bailie D. Wilson (Vice-Convener)	Councillor J. Haig (Vice-Convener)
Bailie F. McClusky	Bailie J. Tulloch
Police Judge D. Cross	Police Judge D. Cross
Councillor A. Crichton	Councillor C. Donnelly
Councillor P. Duffy	Councillor J. Johnston
Councillor J. Haig	Councillor D. Martin
Councillor A. Howson	Councillor T.A. Stewart
Councillor T. Train	Councillor T. Wilson

Sewage Works Department,
Clyde Park Sewage Works,
Motherwell.

February, 1957.

Mr. Convener and Gentlemen,

I have the honour to present my annual report for the year ended December 31st, 1956.

The total rainfall registered at the Clyde Park Sewage Works was 31.49 inches, compared with the figure of 24.85 inches for the previous year which was a very dry year. The low rainfall conditions extended over the early months of 1956, but subsequently the rainfall was heavier, giving dilution to the sewage and causing storm overflows to operate frequently. The total volumes of sewage received at the sewage purification works are not metered, only the volumes given full treatment being recorded, and in the case of the Coursington Works it is not possible to record the flow because of the increased quantity now being received since the completion of the Todholeburn sewer, but it is estimated that a total volume of sewage given full treatment at the three works was 2,172 million gallons (9,700,000 tons) or an average of just under six million gallons per day.

CARBARNS WORKS

Total volume of sewage given full treatment - 1,019,894,000 gallons
Daily average - 2,787,000 gallons

The sewage from the Wishaw and Craigneuk areas of the Burgh is treated at the Carbarns Purification Works which was designed to deal with a daily dry weather flow of two million gallons, and which came into service in 1934. Continuous development of the area draining to this works has increased the quantity of sewage and the overload on the plant is now 30% of the design flow. During the year good progress was made on two projects comprising the first stage of extension of the works - namely the construction of additional sludge drying beds, and an additional sludge digester - both the drying beds and the digester being put into service at the end of December.

The final effluent discharged to the River Clyde was Fair to Good in quality during the first three months of the year, but deteriorated and was Poor during the next three months. This deterioration was ultimately attributed to a breakdown in the underwater cleaning mechanism of the primary clarifier which could not be detected and which resulted in incomplete withdrawal of sludge and the creation of septic conditions. Once this defect was rectified the final effluent quickly improved and was of good quality throughout the second half of the year.

Foaming on the aeration tanks has generally been less than in the previous year although there were occasions when the foam was excessive, whilst on other occasions foam was completely absent. This is in line with experience at Clyde Park Works and also at other sewage purification plants but it is difficult to give a reason for this reduction in foam production. Possible causes which might be suggested are the dilution afforded by prolonged wet weather; reduced wastage in the use of synthetic detergents in the home and in industry; reduced issue of free samples by synthetic detergent manufacturers, or a change in the chemical structure of compound used in detergent manufacture.

Sludge digestion proceeded satisfactorily throughout the year but the estimated figure for gas yield shows a decrease of over two million cubic feet on the previous year. This can probably be partially accounted for by the loss of solids direct to the rivers via storm overflows during wet weather, but there were also losses due to reconstruction work and to leakages on the old pipe lines and gasholder.

The inclement weather conditions were unfavourable to sludge drying and the facilities provided for this purpose were severely taxed, and the lagoons were used for prolonged periods.

Decrease in gas production and the installation of new water circulating pumps and pipe lines resulted in a reduction of 74,499 units in the current generated at the works, and an increase in the current purchased of 26,051 units. The overall current consumption on the works showed a decrease of 48,448 units.

Reduced aeration efficiency on the diffused air activated sludge plant made it necessary to remove and chemically clean all the dome diffusers, the pores of which had become choked. When this had been done the diffusion of compressed air was greatly improved. Extensive repairs were also carried out to the detritor, a new classifier rake being installed and the upper part of the tank wall rebuilt and the rail track reset.

CLYDE PARK WORKS

Total volume of sewage given full treatment	-	787,375,000 gallons
Daily average	-	2,151,000 gallons

The Clyde Park Sewage Works serves the area of Motherwell which drains to the River Clyde. The Works was designed to deal with a daily dry weather flow of 1.5 million gallons, and is at present working satisfactorily at the designed capacity.

On four occasions during the year the otherwise consistently good quality of the final effluent was seriously impaired because of the discharge trade waste effluents to the sewers. On two occasions acid wastes were the cause, on another occasion excess iron and low pH value, whilst the fourth and most serious interference was caused by the discharge of cyanide wastes which sterilised the whole plant. The whole of the activated sludge in the system was completely dispersed and the essential biological purifying agency lost, the final effluent being nothing more than air blown settled sewage. Bringing the plant back to efficient condition was like starting up from scratch, and although in about eight days reasonable clarification was being achieved it was two to three months before biological activity was restored. The cyanide also affected the sludge digestion process, gas production suddenly ceased, but was restored after three days of intensive leaching of the digester.

Apart from the interference by cyanide wastes the sludge digestion process proceeded normally, but there was a decrease in the total gas yield of over one million cubic feet. As in the case at Carbarns Works, this drop in gas yield is attributed to the loss of gas producing organic matter in storm overflow sewage.

COURSINGTON WORKS

Estimated average flow is 1,000,000 gallons per day.

This is the oldest of the Town Council's sewage purification works and it serves the area of Motherwell which drains to the South Calder Water. The plant was put into service about 1906 and is very much overloaded and inefficient. The sewage flowing into this plant contains a high percentage of crude gas liquor and it is very difficult to treat, the effluent being consistently bad. It is anticipated that the gas liquor will cease to be discharged during the next year and the provision of adequate purification capacity for this area is under active consideration by the Town Council and its Officers.

The practice of removing sludge from this plant by tanker wagon was continued throughout the year, and this reduced the odour nuisance caused by air drying of raw sludge in the limited space available. It was found however that the quantity of grit and debris in this sludge caused the inlets to the digester at Clyde Park Works to become choked, and it was therefore decided to dump the sludge on the Coup near Clyde Park where it was buried with house refuse.

During the summer complaints were received from residents in nearby property because of fly nuisance - anisopus fenestralis being the type giving rise to nuisance. Extensive use was made of gammahexane by dosing the filters and spraying the walls and trees around the plant in an attempt to control the emergence of flies.

LABORATORY

Staff changes interfered with the laboratory work to some extent and the total number of samples examined was 1037 as against 1473 for the previous year, but the number of estimations carried out increased from 4954 to 5831. In addition sludge samples totalled 81 and the estimations 332 as against 582 for the previous year. During the year in addition to samples in connection with sewage and trade effluents treatment, analytical work was undertaken on behalf of the Health Committee in connection with the measurement of atmospheric pollution. Five deposit gauges have been set up within the Burgh under the supervision of the Chief Sanitary Inspector and the samples obtained are brought into the laboratory each month for analysis. During the year 41 such samples were examined involving a total number of 342 estimations.

Experimental work carried out during the year has been concerned mainly with the drying of sludge on covered beds, seven trials being made under varying conditions to provide information for future use. Other work involved the control of foam on aeration tanks by spraying with final effluent, and trials were also made using chemical defoamants.

TRADE EFFLUENTS

The surveillance of trade effluents was continued, the number of visits made to trade premises being 193, an increase of three on the previous year, whilst the number of samples taken increased by 56 to a total of 404. Twenty-seven samples of effluent being discharged to the sewer were found to be unsatisfactory for the following reasons:

Low pH value and/or presence of free mineral acid	-	23
Presence of cyanide	-	3
Excessive chromium	-	1
		27

Because of frequent discharges of acid trade effluent from one factory strong representations were made to the management with the result that temporary measures were taken to neutralise the acid pending the installation of a neutralising plant. At another factory it was found that accidental discharges of acid could reach the sewer without passing the neutraliser and steps were then taken to eliminate such discharges.

THE CLYDE RIVER PURIFICATION BOARD

The Clyde River Purification Board commenced officially to exercise its functions as the river purification authority on the 1st October, 1956. The Chief Pollution Officer to the Board made one visit to each of the three sewage purification works serving the Burgh.

STAFF

Assistant Chemist, W. Templeton, was called to do his National Service at the beginning of the year, and Mr. Ian MacLeod was appointed Temporary Assistant Chemist, occupying that post from January 30th to October 16th, 1956. He was succeeded by Mr. C. Cunningham, B.Sc., who commenced his duties on October 25th, 1956.

GENERAL

There were many visitors to the Town Council's Sewage Purification Works. These included Mr. A.E.J. Pettet, Deputy Director of Water Pollution Research to the Water Pollution Research Board; Mr. H. Taylor, President of the Institute of Sewage Purification; Officials of Local Authorities, and Officers and Staff of the Scottish Division of the National Coal Board.

In conclusion I wish to place on record my sincere appreciation of the support given to me throughout the year by the Convener and Members of the Streets and Drainage Committee, and also by the Staff of the Sewage Works Department.

Donald H. Barraclough,

Sewage Works Manager.

Table 1.

Total volume of sewage given full treatment

Month	Carbarns Works	Clyde Park Works	Coursington Works
1956		(Millions of Gallons)	
January	93.851	70.945	-
February	86.715	60.445	-
March	92.433	68.930	-
April	76.310	50.610	-
May	75.084	55.365	-
June	75.145	56.810	-
July	77.709	62.840	-
August	91.590	80.615	-
September	87.502	71.040	-
October	88.680	70.265	-
November	79.161	54.610	-
December	95.714	84.900	-
Total	1,019.894	787.375	-
Daily average	2.787	2.151	Estimated 1.00

Note: Stormwater flows are not metered.

Table 2.

Average daily volume of sewage given full treatment

Month	Carbarns Works	Clyde Park Works	Coursington Works
1956		(Gallons per Day)	
January	3,027,000	2,288,000	-
February	2,990,000	2,084,000	-
March	2,981,000	2,223,000	-
April	2,543,000	1,687,000	-
May	2,422,000	1,786,000	-
June	2,504,000	1,893,000	-
July	2,506,000	2,094,000	-
August	2,954,000	2,600,000	-
September	2,915,000	2,368,000	-
October	2,860,000	2,266,000	-
November	2,638,000	1,820,000	-
December	3,087,000	2,739,000	-
	2,787,000	2,151,000	Estimated 1,000,000

N.B. Figures to the nearest 1000 gallons.

Table 3.

Gas produced from sewage sludge during Digestion

Month	Carbarns Works		Clyde Park Works	
1956	Total cu/ft.	Daily Average cu/ft.	Total cu/ft.	Daily Average cu/ft.
January	643,817	20,768	552,719	17,829
February	640,300	22,079	545,674	18,816
March	654,182	21,102	599,028	19,323
April	600,980	20,032	651,964	21,732
May	661,082	21,325	662,796	21,380
June	546,450	18,215	504,201	16,806
July	530,459	17,111	458,011	15,267
August	410,000	13,226	395,103	12,745
September	424,000	14,133	454,475	15,149
October	503,700	16,248	469,490	15,145
November	444,688	14,822	448,359	14,945
December	336,892	10,867	377,281	12,190
Total	6,396,550		6,119,101	
Average for year		17,477		16,719

Gas used for heating the digester at Clyde Park Works totalled 3,387,654 cubic feet an average of 9,256 cubic feet per day.

MISCELLANEOUS DATA

Area of the Burgh	6330.14 acres
Estimated population	70,300
Approximate yield of 1d. rate	£2,548

Clyde Park Works

Meteorological 1956	Rainfall (ins)	Temperature F. Min.	Temperature F. Max.
January	1.94	18	52
February	1.18	10	52
March	1.77	24	76
April	0.97	27	66
May	1.48	37	66
June	2.63	-	-
July	5.00	46	76
August	4.95	38	72
September	3.87	42	71
October	2.67	31	62
November	1.08	28	56
December	3.95	22	58
Total	31.49	10	76

Design dry weather flow	1,500,000 gallons/day
Present dry weather flow	1,565,000 " "
Detritor operating	2,913 hours
Grit removed by detritor	50 cu. yds.
Total flow treated	787,375,000 gallons
Activated sludge returned to plant	370,619,000 gallons
do. do. as per cent of total flow	47.07%
Surplus activated sludge	13,451,800 gallons
do. do. as per cent of total flow	1.71%
Activated sludge in mixed liquor (1 hour) average	16.0%

Carbarns Works

Design dry weather flow		2,000,000 gallons/day
Present dry weather flow		2,600,000 gallons/day
Detritor operating		2,045 hours
Grit removed by detritor		38 cu. yds.
Screenings removed		25 cu. yds.
Current generated	No. 1 engine	120,472 kWH
	No. 2 engine	220,069 kWH
Current purchased		62,724 kWH
Total current used		403,265 kWH
Current used per million gallons of sewage treated		395 kWH

STAFF

Chief Charge Engineer - T. Scott

Assistant Chemist (on National Service) - W. Templeton, A.M.Inst.S.P.

Temporary Assistant Chemist - I. MacLeod (Resigned 16/10/56)

- C. Cunningham, B.Sc. (from 25/10/56)

Apprentice Chemist - E.R. Napier

Maintenance Engineer/Foreman Carbarns Works - C. Naules

Maintenance Engineer/Foreman Clyde Park Works - J.F. Taylor

Attendant - Coursington Works - J. Felvus